PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

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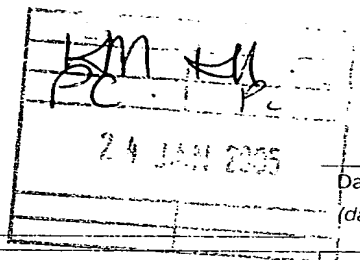

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Rule 71.1)

Date of mailing *(day/month/year)*	20.01.2005
Applicant's or agent's file reference	**IMPORTANT NOTIFICATION**
P/63698/GPTX18	

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/GB 03/04195	29.09.2003	02.10.2002

Applicant
MARCONI COMMUNICATIONS LIMITED et al

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.

2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.

3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. **REMINDER**

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

The applicant's attention is drawn to Article 33(5), which provides that the criteria of novelty, inventive step and industrial applicability described in Article 33(2) to (4) merely serve the purposes of international preliminary examination and that "any Contracting State may apply additional or different criteria for the purposes of deciding whether, in that State, the claimed inventions is patentable or not" (see also Article 27(5)). Such additional criteria may relate, for example, to exemptions from patentability, requirements for enabling disclosure, clarity and support for the claims.

Name and mailing address of the international preliminary examining authority:

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PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
P/63698/GPTX18		

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/GB 03/04195	29.09.2003	02.10.2002

International Patent Classification (IPC) or both national classification and IPC

H04B10/17

Applicant

MARCONI COMMUNICATIONS LIMITED et al

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 6 sheets, including this cover sheet.

   ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the opinion
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - VI ☐ Certain documents cited
   - VII ☐ Certain defects in the international application
   - VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
27.04.2004	20.01.2005

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB 03/04195

I. Basis of the report

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*:

Description, Pages

1-13 as originally filed

Claims, Numbers

1-12 as originally filed

Drawings, Sheets

1/2-2/2 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

   These elements were available or furnished to this Authority in the following language: , which is:

   ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).

   ☐ the language of publication of the international application (under Rule 48.3(b)).

   ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

   ☐ contained in the international application in written form.

   ☐ filed together with the international application in computer readable form.

   ☐ furnished subsequently to this Authority in written form.

   ☐ furnished subsequently to this Authority in computer readable form.

   ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

   ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

   ☐ the description, pages:

   ☐ the claims, Nos.:

   ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-12
	No:	Claims	
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-12
Industrial applicability (IA)	Yes:	Claims	1-12
	No:	Claims	

2. Citations and explanations

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Reference is made to the following documents - cited in the International Search Report -:

D1: EP-A-1 182 808
D2: WO 02/17520 A
D3: US 2002/097480 A1

2. The document D1 is regarded as being the closest prior art to the subject-matter of independent **claim 1**, and discloses (cf. abstract; page 2, line 56-page 3, line 53; page 4, line 30-page 6, line 46; figs.3,8,10,12,14,15):

A Raman amplification system for amplifying WDM radiation (104) propagating along an optical fibre (1), said WDM radiation (104) comprising a plurality of radiation components each having a selected waveband, the system comprising:

- a plurality of optical radiation generating means (6-1,.., 6-n) operable to generate pump radiation of a selected wavelength and power, said radiation being coupled into said fibre (1) to optically amplify the WDM radiation (104); and

- means (PD1,..,PDm) for measuring the power of the radiation components of the WDM radiation (104) after it has propagated along the fibre (1) and has been amplified,

wherein the power of operation of the pump generating means (6-1,.., 6-n) is controlled in dependence upon the measured power such as to make the measured powers substantially equal in magnitude and of a selected magnitude.

3. The subject-matter of **claim 1** differs from the disclosure of D1 in that:

(a) the feedback loop which is used in D1 to control the optical power of the pump generating means is also used - in **claim 1** - to control the pump wavelength and, thus, the pump generating means of **claim 1** are wavelength tunable.

The subject-matter of **claim 1** is therefore novel (Article 33(2) PCT). Consequently,

dependent **claims 2-12** are also novel.

4. The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of **claims 1-12** does not involve an inventive step in the sense of Article 33(3) PCT. Detailed explanations in this respect will be given in the next paragraphs

5. The problem to be solved by the present invention may therefore be regarded as:
- how to provide and optimize Raman amplification in a WDM system.

6. The solution proposed in **claim 1** of the present application cannot be considered as involving an inventive step (**Article 33(3) PCT**) for the following reasons:

(a) A person skilled in the field of optical communications knows that the gain of a Raman amplifier is dependent not only on the optical power but also on the wavelength of the pump generating means. See, for example, comments and/or explanations in this respect in documents D2 (page 5, lines 16-18) or D3 (par.0009, 0094, 0095; claims 9, 62). Furthermore, D1 explicitly states (cf. par.0054) that, by varying the pump wavelength, it is possible to equalize the measured powers of the amplified WDM signal. Thus, it would be a straightforward design option for a skilled person to add pump wavelength control to the above mentioned feedback loop of D1 - where power control of the pump is already implemented - in order to drive and/or to optimize Raman amplification in a WDM system, and the easiest and most intuitive way to implement said pump wavelength control would be by means of any conventional sort of wavelength tunable source.
Consequently, the subject-matter of **claim 1** is regarded as a matter of obviousness for a skilled person in view of D1.

7. Dependent **claims 2-12** do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of inventive step, the reasons being as follows:

(a) **claims 2, 5, 6 and 10** consist merely of normal design options and/or procedures that the skilled person would take into consideration - in accordance with circumstances and without the exercise of inventive skill - when involved in the design of a Raman amplifier as the one known from D1;

(b) the feature added by **claim 3**, i.e., measuring an average power over a

number of radiation components for at least two groupings of components and controlling the pump generating means depending on said average powers, is also disclosed by D1 (cf. par.0040 to par.0045 and fig.3);

(c) like **claim 4**, D1 also discloses (see WDM DMUX 5 in fig.3) a wavelength selective component for spatially separating the WDM radiation into the radiation components;

(d) the feature of combining different states of polarization of pump sources in order to reduce polarization dependent gain is also known from D1 (par.0093; fig.10) or D2 (page 6, lines 1-15, figs.2,3). The subject-matter added by **claims 7-9** is therefore regarded as a matter of obviousness for a skilled person;

(e) the subject-matter of **claims 11 and 12** is also disclosed by D1 (par.0146; claims 56-59 and 64-67).